Original Article

Assessment of outcomes in a service of secondary care for patients with Diabetes *mellitus**

Avaliação de resultados em um serviço de atenção secundária para pacientes com Diabetes mellitus

Evaluación de resultados en un servicio de atención secundaria para pacientes con Diabetes mellitus

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ABSTRACT

Objective: To evaluate the outcome component in a secondary care service for users with Diabetes *mellitus* type 2 (DM2), adopting control of arterial blood pressure (ABP), glycated hemoglobin and low density lipoprotein as indicators. **Methods:** A retrospective chart review involving the analysis of these indicators, obtained in the years between 2007 and 2009, based on the consultation of 108 medical records of users from a secondary care service, conducted in the evaluation of health care. **Results:** The results showed that 30.3% of the users reached the goal for glycated hemoglobin, 48.1% for arterial blood pressure, and 42.3% for the low density lipoprotein. **Conclusion:** The data evaluated were similar to those found in other international and national investigations, with a large proportion of the users with DM2 studied, presenting with control of hemoglobin A1c levels, ABP and LDL-C, lower than those recommended in the consensus.

Keywords: Health evaluation; Diabetes *mellitus*, type 2/nursing; Quality indicators, health care

RESUMO

Objetivo: Avaliar o componente resultado em um serviço de atenção secundária a usuários com Diabetes *mellitus* tipo 2, tomando como indicadores os controles de pressão arterial, hemoglobina glicada e lipoproteína de baixa densidade**. Métodos**: Estudo do tipo documental e retrospectivo envolvendo a análise desses indicadores, obtidos nos anos entre 2007 e 2009, com base na consulta de 108 prontuários de usuários de um serviço de atenção secundária, realizada na avaliação de cuidados em saúde. **Resultados:** Os resultados evidenciaram que 30,3% dos usuários alcançaram a meta para a hemoglobina glicada, 48,1%, para a pressão arterial e 42,3%, para a lipoproteína de baixa densidade. **Conclusão**: Os dados avaliados foram semelhantes aos encontrados em outras investigações internacionais e nacionais, com grande proporção de usuários com DM2 estudados, apresentando controle dos níveis hemoglobina A1c, PA e LDL-C, aquém do preconizado nos consensos.

Descritores: Avaliação em saúde; Diabetes mellitus tipo 2/enfermagem; Indicadores de qualidade em assistência à saúde

RESUMEN

Objetivo: Evaluar el componente resultado en un servicio de atención secundaria a usuarios con Diabetes *mellitus* tipo 2, tomando como indicadores los controles de presión arterial, hemoglobina glicada y lipoproteína de baja densidad. **Métodos:** Estudio de tipo documental y retrospectivo que involucró el análisis de esos indicadores, obtenidos en los años entre 2007 y 2009, con base en la consulta de 108 historias clínicas de usuarios de un servicio de atención secundaria, realizada en la evaluación de cuidados en salud. **Resultados:** Los resultados evidenciaron que el 30,3% de los usuarios alcanzaron la meta para la hemoglobina glicada, 48,1%, para la presión arterial y el 42,3%, para la lipoproteína de baja densidad. **Conclusión:** los datos evaluados fueron semejantes a los encontrados en otras investigaciones internacionales y nacionales, con gran proporción de usuarios con DM2 estudiados, que presentaban control de los niveles hemoglobina A1c, PA e LDL-C, por debajo de lo preconizado en los consensos.

Descriptores: Evaluación en salud; Diabetes *mellitus* tipo 2/enfermería; Indicadores de calidad de la atención de salud

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INTRODUCTION

Despite the implementation of the National Plan for the Reorganization of Diabetes *Mellitus* and Hypertension Care and the increasing number of cases of the disease in Brazil, the Ministry of Health has been emphasizing the need for evaluation of health services by municipalities regarding the measurement of outcomes of care in diabetes *mellitus* (DM) and thus obtain elements to guide the health actions planning[1].

In this sense, the Brazilian Diabetes Society (SBD) set outcome indicators to evaluate the DM care in the country, especially for glycated hemoglobin A1c, blood pressure (BP), LDL cholesterol (LDL-C), lipid profile altogether, examination of eye fundus, anti-smoking education, waist circumference evaluation, renal function and feet[2].

Although the overall assessment of these indicators are recommended to analyze the outcomes of diabetes care, experts point out the importance of valuing the control of hemoglobin A1c, LDL-C and BP in the prevention of complications associated with type 2 diabetes *mellitus* (T2DM)[3,4]. In addition, the evidences indicate that a large number of people with T2DM does not reach the recommended targets for these indicators[5,6].

The aforementioned scenario can also be found in the Brazilian context, considering that multicenter study, 13 endocrinology outpatient services in eight Brazilian cities, showed that the normal parameters of hemoglobin A1c, LDL-C and BP are rarely achieved in clinical practice. And yet, the availability of screening for complications of DM is low[7].

The importance of hemoglobin A1c as a parameter for glycemic control is due to the fact that this reflects the average blood glucose over several months and have strong predictive value for DM complications[8]. However, other parameters such as BP and LDL-C should be evaluated and targets pursued, because the isolated control of glycemia in T2DM patients with poor control had no significant effect on rates of major cardiovascular events, death, or microvascular complications[9].

In Brazil, few evaluative studies are found about the targets for metabolic control of hemoglobin A1c, BP and LDL-C[7,10,11].

Thus, in this investigation the privileged indicators were hemoglobin A1c, LDL-C and BP, since the control of these parameters contributes significantly to the prevention of cardiovascular disease (CVD), considered the leading cause of morbidity and mortality for people with T2DM[8].

Moreover, in Ceará State, there is little research on that theme in secondary care to the detriment of the primary care network. Given this gap in the literature, it is clear that further research involving the aforementioned indicators are necessary for development of epidemiological data, able to support public health policies for people with DM.

Therefore, the study aimed to evaluate component resulting in patient care with diabetes mellitus type 2, taking as control indicators blood pressure, glycated hemoglobin and low-density lipoprotein, since, according to Donabedian[12], the outcomes refer to the effects that the actions and procedures cause in the clients assisted, which requires the representative indicators selection to be evaluated.

METHODS

This is a retrospective documental study, developed at the Integrated Center for Diabetes and Hypertension (CIDH), in the city of Barbalha, located in the south of the State of Ceará (Brazil).

The population was constituted by 934 health records of patients with DM2 enrolled in aforementioned Center. For inclusion in the health records study, the following criteria were used: health records of DM2 patients with at least two or more physician visits per year, from January 2007 to December 2009. This chronological gap was chosen due to the secondary care service had started its activities with DM care protocol in 2003, fact that allows a more accurate assessment in relation to four years of initial application of the treatment protocol. The frequency criterion of medical visits is justified because the service protocol of DM from CIDH-Barbalha, which recommends users the frequency of at least two physician visits per year[13]. Thus, the final sample included 108 health records.

The data were collected during May and June 2010, through a form containing variables related to gender, age, hemoglobin A1c, BP and LDL-C registered in the patient record. It is emphasized that the information was computed from the previous 6 months of 2009, registering the hemoglobin A1c, BP and LDL-C[2].

To organize the data, we proceeded to the variables codification contained in the used forms, which subsequently were stored in MS Excel by double entry. For the interpretation of hemoglobin A1c, BP and LDL-C, the recommendations of the Brazilian Society of Diabetes[2], were taken as a basis, namely: A1c <7.0%, BP <130/80 mmHg and LDL-C <100 mg/dl. The information processing occurred in the Epi-Info software version 6.04. The 95% confidence interval was adopted. In the associations analysis of hemoglobin A1c, BP and LDL-C with categorical variables were used Fisher's exact test and chi-square

and, in the analysis of homogeneity of variances, the Bartlett's test.

In fulfillment to the requirements, the research project was approved by the Ethics Committee of Federal University of Ceará, No. CAAE 318566.

RESULTS

The results of this study showed that a substantial part of the sample, 92 (85.1%) were female and 37 (34.3%) age range between 70 and 79 years.

Table 1. Control of glycated hemoglobin, blood pressure and low-density lipoprotein by users of the Integrated Center for Diabetes and Hypertension. Barbalha, Ceará, Brasil, 2010

Parameters	N	%
Hemoglobin A1c* < 7%	30	30.3
BP** < 130/80 mmHg	52	48.1
LDL-C*** < 100 mg/dl	36	42.3

* Ninety-nine health records were found for glycated hemoglobin (n=99)
** Hundred-eight health records were found for blood pressure (n=108)
*** Eighty-five health records were found for low-density lipoprotein (n=85)

According to the obtained data, it is emphasized: the indicator hemoglobin A1c <7%, 108 surveyed, 99 (93.5%) were registered in health records. From these, 30 (30.3%) achieved the set target. Regarding to BP < 130/80 mmHg, 108 (100%) of DM2 had health records, but only 52 (48.1%) achieved the recommended target. Regarding to LDL-C <100 mg/dl, 85 (78.7%) records, 36 (42.3%) achieved the target proposed by the SBD (Table 1).

Table 2. Association between the achieving targets for hemoglobin A1c, blood pressure and LDL-C and users sex of the Integrated Center for Diabetes and Hypertension. Barbalha, Ceará, Brasil, 2010

Parameters	Female N (%)	Male N (%)	p-value
Hemoglobin A1c	28 (93,3)	2 (6.7)	0.237 *
Blood pressure	7 (13,5)	45 (86.5)	0.457*
LDL-C	5 (13,9)	31 (86.1)	0.911**

* Fisher's exact test, ** Chi-square test.

As exposed, 28 out of 30 records of the users with DM2 who have achieved the target for hemoglobin A1c, (93.3%) were women. However, there was no statistical significance to claim that women have better control than men. Regarding to the BP and LDL-C, males obtained a higher percentage than female. However, there was also no statistical significance in the study for these parameters (Table 2).

Table 3. Association between the achieving targets for hemoglobin A1c, blood pressure and LDL-C and users age group of the Integrated Center for Diabetes and Hypertension. Barbalha, Ceará, Brasil, 2010

Parameters	40-49 N (%)	50-59 N (%)	60-69 N (%)	70-79 N (%)	≥ 80 N (%)	Valor de p*
Hb A1c	1 (3.3)	5 (29.4)	8 (25.8)	12 (32.4)	4 (26.7)	0.050
BP	5 (9.6)	10 (19.2)	15 (28.8)	14 (26.9)	8 (15.4)	0.420
LDL-C	3(8.3)	5 (13.9)	10 (27.8)	12 (33.3)	6 (16.7)	0.588

* Chi-square test. Hb A1c – glycated hemoglobin

According to the data relating to the association between the achieving targets for hemoglobin A1c and age group, there was a predominance in the 70-79 years age group. Regarding blood pressure, the 60-69 years age group reached the highest rate with 28.8%. Regarding to LDL-C, users with DM2 in the 70-79 years age group the percentage reached 33.3%. However, the study showed that there was no statistical significance among all the parameters investigated and age group (Table 3).

DISCUSSION

In this study, there was a predominance of females among the subjects, similar to other reports analyzed[5,7]. Despite the evidenced trend in the literature regarding predominance of women, the DM prevalence study in Brazil did not confirm a statistically significant association between this disease and gender[14].

As observed, the high number of elderly in this study is consistent with the other investigations results[10,15]. In this sense, a new profile of assisted clients in the health care services is configured because of the increase of aging. This reality requires planning by the managers as well as professional qualification to meet this demand [16]. However, it is advised that the high percentage of elderly with DM in the study implies a service aimed at meeting their needs, inherent to the aging process, besides those associated with chronic disease. In DM education programs need to consider the demographic characteristics of people with DM treated in order to adapt the guidelines to their needs.

Also, as noted, in this article there was no significant statistical association among the results of hemoglobin A1c, blood pressure and LDL-C for gender and age. Other analyzed articles did not find statistical significance among gender with BP control [7], hemoglobin A1c and blood pressure [17] and LDL-C and A1c[18]. In the issue of age group, was found only one publication in which average age was associated with BP control and LDL-C and found that subjects with DM2 with more advanced age presented lower levels of these parameters [10].

Despite strong evidence that jointly control of the hemoglobin A1c, blood pressure and LDL-C reduces the cardiovascular events risk in people with DM2, a large proportion of subjects in this study did not achieve the targets recommended by SBD[2] in respect of these indicators.

According to the data, the targets for hemoglobin A1c controlling were achieved by only 30.30% of the surveyed. Identical results were identified in other studies [5,19]. However, as show studies conducted in Brazil, 46% and 22.4%, respectively, of the subjects investigated reached the goals for A1c (7.11).

According to the literature, good control of hemoglobin A1c reduces the risk of macro and microvascular complications in DM2, so as to say, that the need of the normalization of this parameter has to be the central objective of these clients assistance planning. Nevertheless, combined with appropriate treatment to each patient, other measures such as encouraging physical activity and following an individualized nutrition plan should be encouraged and evaluated, because these actions contribute effectively to the improvement of DM glycemic control[8].

Also, as shown by the data, the lower proportion of subjects that achieved the target of BP was similar to other investigations[5-6]. But, in another study, 83% of subjects had BP <130/80mmHg[20]. Maintaining BP levels below 130/80 mmHg should be the goal for all patients and objective to be pursued by all healthcare professionals in the disease management, since hypertension is a risk factor for development cardiovascular disease in diabetic patients[8].

Certain initiatives, such as practice actions of interactive health education through partnerships between the multidisciplinary team and DM2 users contribute effectively to the reduction of BP parameters. A recent study conducted in a district unit of the Amapá State was observed a median reduction of 2mm/Hg in systolic blood pressure in patients enrolled in educational program[21].

Regarding to the parameter LDL-C <100mg/dl, as evidenced in this study, 42.3% achieved the target set. Similar results were found by other researchers[11,20]. But, as in a multicenter study[7], lower target was obtained by subjects, with 26%. Already in research conducted in Canada, 83.9% of DM2 clients had LDL-C <100mg/dl[5]. Furthermore, longitudinal study developed in the Netherlands[22] found that the management of dyslipidemia and hypertension in DM, in addition to hyperglycemia, has improved in recent decades. However, it is still a high proportion of patients with unsatisfactory control. Thus, it is essential to accurate monitoring and adjustments in therapy with the goal of improving patient outcomes.

For many patients with diabetes *mellitus*, the first priority for the treatment of dyslipidemia is to reduce LDL-C to the desired targets, <100mg/dl, including in addition to medication, nutrition and physical activity interventions[8]. In clinical practice, can still be observed underuse of medications for the management of dyslipidemia[22], indicating a need for greater intensification of the initiation and therapy adjustment. These initiatives will improve the quality of management services in DM2.

Overall, the unsatisfactory results to achieve the metabolic control of DM2 can be attributed to factors such little awareness of adherence to consensus by physicians, lack of specialist in primary care, lack of patient adherence to therapeutic approach, coupled with low motivation and qualification of health professionals on the consensus recommendations[19]. However, it should be remembered that: patient education for self-care and qualification of health professionals are strategies liable to optimize adherence to recommendations and contribute to improving outcomes of DM2 patients in the metabolic control.

According to evidence, in DM2 care strategies that employ a multidisciplinary approach, patient-centered, through developing partnerships, are effective to motivate and empower individuals with diabetes to take control of their condition and thus achieve the desirable targets for a good control[23,24].

CONCLUSION

This research data were similar to those found in other international and national researches, with a large proportion of users with DM2 studied, with control of hemoglobin A1c levels, blood pressure and LDL-C, lower than those recommended in the consensus.

However, it is worth noting the significant percentage of registration of indicators assessed in the health records, strengthening the idea of membership of professional guidelines proposed by the consensus regarding the request tests for metabolic control of DM. Furthermore, the data suggest that socioeconomic factors, cultural and related to the patient can be conditioned on the achievement of these targets.

Thus, the results show the importance of practice assessment as a tool to guide the planning of interventions to improve the quality of the DM management. In this way, it suggests the adoption of strategies to encourage more partnerships between health professionals and people with DM2, because this disease requires self-management and behavior change.

Nurses can develop health education in the discussed service and sharing with patients the results and encouraging them to pursue the targets of good control. It is still recommended the implementation of new

evaluation studies in other services so as to investigate the other clippings of the evaluation process, such as user satisfaction with the care provided by health professionals and those professionals with the quality of care offered, since this can promote the quality of management attention on the DM.

REFERENCES

1. Brasil. Ministério da Saúde. Política Nacional de Avaliação de Desempenho do SUS. Brasília (DF): Ministério da Saúde; 2007.
2. Sociedade Brasileira de Diabetes. Tratamento e acompanhamento do Diabetes mellitus. Diretrizes da Sociedade Brasileira de Diabetes. São Paulo: Sociedade Brasileira de Diabetes; 2009.
3. Stratton IM, Cull CA, Adler AI, Matthews DR, Neil HA, Holman RR. Additive effects of glycaemia and blood pressure exposure on risk complications in type 2 diabetes: a prospective observational study (UKPDS 75). Diabetologia. 2006;49(8):1761-9.
4. Gaede P, Vedel P, Larsen N, Jensen GV, Parving HH, Pedersen O. Multifactorial intervention and cardiovascular disease in patients with type 2 diabetes. N Engl J Med. 2003;348(5):383-93.
5. Harris SB, Worrall G, Macaulay A, Norton P, Webster-Bogaert S, Donner A, et al. Diabetes management in Canadá: baseline results of the group practice diabetes management study. Can J Diabetes. 2006;30(2):131-7.
6. Kemp TM, Barr EL, Zimmet PZ, Cameron AJ, Welborn TA, Colagiuri S, et al. Glucose, lipid, and blood pressure control in Australian adults with type 2 diabetes: the 1999-2000. Diabetes Care 2005;28(6):1490-2.
7. Gomes MB, Gianella D, Faria M, Tambascia M, Fonseca RM, Réa R, et al. Prevalence of type 2 diabetic patients within the targets of care guideline in daily clinical practice: a multi-center study in Brazil. Rev Diabet Stud. 2006;3(2):82-7.
8. American Diabetes Association. Standards of medical care in diabetes – 2010. Diabetes Care 2010; 33 Suppl 1:S11-61.
9. Duckworth W, Abraira C, Moritz T, Reda D, Emanuele N, Reaven PD, et al. Glucose control and vascular complications in veterans with type 2 diabetes. N Engl J Med. 2009;360(2):129-39.
10. Panarotto D, Teles AR, Schumacher MV. Fatores associados ao controle glicêmico em pacientes com diabetes tipo 2. Rev Assoc Med Bras. 2008;54(4):314-21.
11. de Silva AB. Avaliação da atenção em Diabetes mellitus em uma Unidade Básica Distrital de Saúde de Ribeirão Preto-SP [tese]. Ribeirão Preto (SP): Universidade de São Paulo, Escola de Enfermagem; 2009.
12. Donabedian A. Exploration in quality assessment and monitoring. Ann Arbor: Health Administration Press;1980. Basic approaches do assessment: structure, process, outcome; p.77-125.
13. Prefeitura Municipal de Barbalha. Secretaria Municipal de Saúde de Barbalha. Centro Integrado de Diabetes e Hipertensão. Protocolo de atendimento em hipertensão e diabetes. Barbalha (CE): Secretaria de Saúde; 2003.
14. Malerbi DA, Franco LJ. Multicenter study of the prevalence of diabetes mellitus and impaired glucose tolerance in the urban Brazilian population aged 30-69 yr. The Brazilian Cooperative Group on the Study of Diabetes Prevalence. Diabetes Care. 1992;15(11):1509-16.
15. Elis A, Rosenmann L, Chodick G, Heymann AD, Kokia E, Shalev V. The association between glycemic, lipids and blood pressure control among Israel diabetic patients. QJM. 2008;101(4):275-80.
16. Veras R. Envelhecimento populacional contemporâneo: demandas, desafios e inovações: [revisão]. Rev. Saúde Pública. 2009;49(3):548-54.
17. Gucciardi E, Wang SC, DeMelo M, Amaral L, Stewart DE. Characteriswtcs of men and women with diabetes. Can Fam Physician. 2008;54(2):219-27.
18. Tseng C, Sambamoorthi U, Rajan M, Tiwari A, Frayne S, Findley P, et al. Are there gender differences in diabetes care among elderly Medicare enrolled veterans? J Gen Intern Med. 2006;21 Suppl 3:S47-53.
19. Tan F, Chan G, Wong JS, Rozario F. Standard of care for type 2 diabetic patients in a public hospital general medical clinic: report of a self-audit. Med J Malaysia. 2008;63(3):224-8.
20. Donovan PJ, Mclntyre HD. Achievement of cardiovascular risk factor targets in young adults with Diabetes mellitus. Diabetes Metab Syndr Obes. 2010;3:387-94.
21. Miyar-Otero L, Arrelias CC, de Lima YC, Pena FP, dos Santos MA, Teixeira CR, et al. Seguimento de pacientes com Diabetes mellitus em um serviço de atenção básica: parâmetros clínicos e laboratoriais. Rev Enferm UERJ. 2010;18(3):423-8.
22. Greving JP, Denig P, de Zeeuw D, Bilo HJ, Haaijer-Ruskamp FM. Trends in hyperlipidemia and hypertension management in type 2 diabetes from 1998-2004: a longitudinal observational study. Cardiovasc Diabetol. 2007;6(25):1-8.
23. Aschner P, LaSalle J, McGill M; Global Partnership for Effective Diabetes Management. The team approach to diabetes management: partnering with patients. Int J Clin Pract Suppl. 2007;(157):22-30.
24. de Belvis AG, Pelone F, Biasco A, Ricciardi W, Volpe M. Can primary care profissionals' adherence to Evidence Based Medicine tools improve quality of care in type 2 diabetes mellitus? A systematic review. Diabetes Res Clin Pract. 2009; 85(2):119-31.